4.4 HW

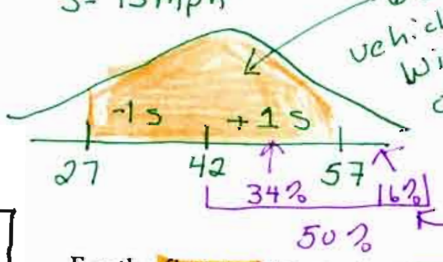
4.39

a The value 57 is one standard deviation above the mean. The value 27 is one standard deviation below the mean. By the empirical rule, roughly 68% of the vehicle speeds were between 27 and 57.

b From part a it is determined that 100% – 68% = 32% were either less than 27 or greater than 57. Because the normal curve is symmetric, this allows us to conclude that half of the 32% (which is 16%) falls above 57. Therefore, an estimate of the percentage of fatal automobile accidents that occurred at speeds over 57 mph is 16%.

A $\bar{x} = 42$ mph
$s = 15$ mph

68% of the vehicle speeds within 1 std dev of mean (27 to 57mph)



B 16% of the Vehicles have accidents at speeds over 57mph

4.43

For the first test the student's z-score is $z = \frac{(625-475)}{100} = 1.5$

for the second test it is $z = \frac{(45-30)}{8} = 1.875.$

Since the student's z-score is larger for the second test than for the first test, the student's performance was better on the second exam.

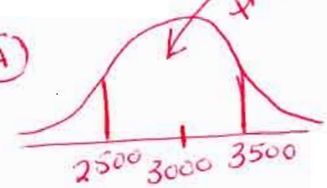
4.45

$\bar{x} = 3{,}000$
$s = 500$

Since the histogram is well approximated by a normal curve, the empirical rule will be used to obtain answers for part a – c.

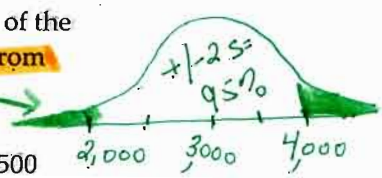
A Because 2500 is 1 standard deviation below the mean and 3500 is 1 standard deviation above the mean, about 68% of the sample observations are between 2500 and 3500.

68% within +/- 1 std dev of the mean



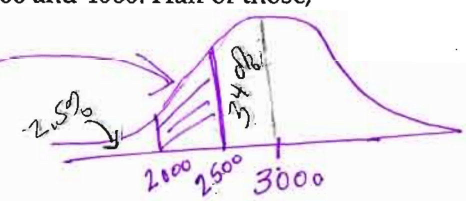
B Since both 2000 and 4000 are 2 standard deviations from the mean, approximately 95% of the observations are between 2000 and 4000. Therefore about 5% are outside the interval from 2000 to 4000.

5% outside



C Since 95% of the observations are between 2000 and 4000 and about 68% are between 2500 and 3500, there is about 95 – 68 = 27% between 2000 and 2500 or 3500 and 4000. Half of those, 27/2 = 13.5%, would be in the region from 2000 to 2500.

50% - 34% - 2.5% = 13.5%



MUST SHOW THIS WORK

$\bar{X} = 450$ wpm
$S = 70$ wpm

$$Z = \frac{X - \bar{X}}{S} = \frac{X - 450}{70}$$

4.50

(a) $z = \frac{320 - 450}{70} = -1.86$

(b) $z = \frac{475 - 450}{70} = 0.36$

(c) $z = \frac{420 - 450}{70} = -0.43$

(d) $z = \frac{610 - 450}{70} = 2.29$

4.52 The z-score associated with the first stimulus value is (4.2 – 6.0)/1.2 = –1.5 and for the second stimulus value it is (1.8 – 3.6)/.8 = –2.25. Since the z-score associated with the second stimulus reading is more negative (–2.25 is less than –1.5), you are reacting more quickly (relatively) to the second stimulus than to the first.

STIMULUS 1

$$Z = \frac{4.2 - 6}{1.2}$$

$Z = -1.5$

STIMULUS 2

$$Z = \frac{1.8 - 3.6}{.8}$$

$Z = -2.25$

4.54

METHOD I: ENTER DATA INTO A LIST AND USE STAT
$\bar{X} = 11.61$ MEDIAN = 10.05

7.6, 8.3, 9.3, 9.4, 9.4, 9.7, 10.4, 11.5, 11.9, 15.2, 16.2, 20.4

$$\bar{x} = \frac{139.3}{12} = 11.61$$

The sample median equals $\frac{9.7 + 10.4}{2} = 10.05$

METHOD II – CREATE STEM PLOT TO FIND MEDIAN

7	6
8	3
9	3 4 4 7
10	4
11	5 9
15	2
16	2
20	4

6

6

FINDINGS

The sample mean is somewhat larger than the sample median because of the outliers 15.2, 16.2 and 20.4. The sample median is more representative of a typical value since it is not influenced by the mentioned outliers.

4.62 Budget: lower quartile = (4.0 + 4.1)/2 = 4.05 Q1

upper quartile = (7.7 + 7.9)/2 = 7.80 Q3

iqr = 7.80 – 4.05 = 3.75

lower mild outlier cutoff = 4.05 – 1.5(3.75) = –1.575

upper mild outlier cutoff = 7.80 + 1.5(3.75) = 13.425

There are no outliers in the budget data. ← CAN SEE BY BOX PLOT

REVIEW HOW TO FIND QUARTILES

Midrange : lower quartile = 6.7 Q1

upper quartile = 8.1 Q3

iqr = 8.1 – 6.7 = 1.4

lower mild outlier cutoff = 6.7 – 1.5(1.4) = 4.6

upper mild outlier cutoff = 8.1 + 1.5(1.4) = 10.2 — NEED TO KNOW HOW TO FIND CUTOFFS

~~lower extreme outlier cutoff = 6.7 – 3(1.4) = 2.5~~ NOT NECESSARY

There are no outliers on the high end. There are two outliers on the low end. 4 AND 1.5. ~~A mild outlier of 4 and an extreme outlier of 1.5.~~

CAN USE TRACE to IDENTIFY OUTLIERS.

First-class: lower quartile = 6.6 Q1

upper quartile = 7.8 Q3

iqr = 7.8 – 6.6 = 1.2

lower mild outlier cutoff = 6.6 – 1.5(1.2) = 4.8

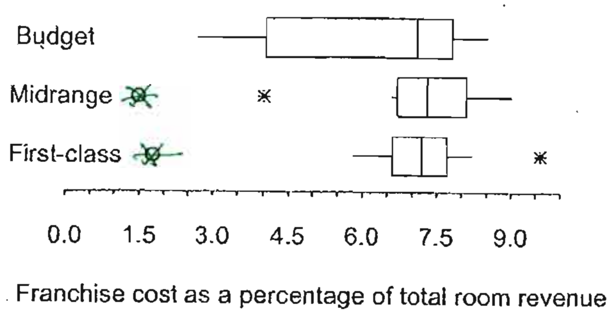
upper mild outlier cutoff = 7.8 + 1.5(1.2) = 9.6

lower extreme outlier cutoff = 6.6 – 3(1.2) = 3.0

upper extreme outlier cutoff = 7.8 + 3(1.2) = 11.4 — NOT NECESSARY

There is an ~~extreme~~ outlier of 1.8 on the low end and a ~~mild~~ outlier of 9.6 on the high end.

Boxplots for the franchise costs of the three types of hotels are given below.



CLEARLY LABEL AND USE SAME SCALE FOR ALL 3 TYPES.

SUMMARY: NOTICE ANSWER IS IN CONTEXT "FRANCHISE COST" AND DISCUSSES CUSS!

The median franchise cost is about the same for each type of hotel. The variability of franchise cost differs substantially for the three types. With the exception of a couple of outliers, first-class hotels vary very little in the cost of franchises, while budget hotels vary a great deal in regard to franchise costs. Ignoring the outliers, the distribution of franchise costs for first-class hotels is quite symmetric; mid-range hotels have a distribution of franchise costs which is slightly skewed to the right; while budget hotels have a distribution of franchise costs which is skewed to the left.